

file 998125

TO: 4623 Personnel

DATE: 7 December 1965

25X1

FROM:

COPIES:

SUBJECT: Additional Modifications For AP-3 Stereoplotter

1. Line Assignments

The following line assignments have been made for the special AP-3 programs:

Lines 21, 22, 23	Change Accuracy Routine
Lines 24, 25, 26	Digital Veltropolo Routine
Lines 27, 28, 29	Averaging Routine
⇒ Line 60	Type Coordinate Routine

If additional program storage is needed, part or all of the Change Accuracy Routine will be written over the absolute orientation routine which is not needed at $1\frac{1}{2}\mu$ accuracy.

2. New Instructions

Several new instructions have been incorporated in the AP-3 computer. Some of these are now included in the AS-11B, however some are completely new.

2.1 Masking Instruction (N = 20)

The masking instruction allows any combination of bits to be extracted from a data word. Before the masking instruction is executed, the mask word is written in line 31 (either word) and the word to be masked is placed in the accumulator. When the instruction is executed, the bits in the accumulator

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will be unchanged where the corresponding mask word bits are ONE's and will be ZERO's where the mask word bits are ZERO's. The masking instruction must be executed during an even or odd word time depending on the location of the mask word. It is possible to interchange the location of the mask word and the data word without consequence.

2.2 Transfer From Short Lines to Non-Parity Lines (32, 34, 48, 50)

These instructions are identical to the instructions for parity lines except that parity is not considered.

2.3 Transfer From Non-Parity to Short Lines (40, 42, 56, 58)

These instructions are also identical to the instructions for parity lines except that parity is not considered.

2.4 Read Short Lines Contents Without Parity (56 for line 30, 57 for line 31)

These instructions allow data which has been transferred to a short line from a non-parity line to be read without parity.

3. Type Output Routine

The Type Output routine will type out four different combinations of information. They are:

1. Photo Points, Model Points, and D_m
2. Photo Points
3. Model Points and D_m
4. D_m

The quantities typed out may be either averaged coordinates or normal coordinates depending on whether or not averages have been taken.

If no averages have been computed, the average routine will be passed through once before the selected coordinates are typed out. This has the effect of transferring the normal coordinates to the average coordinates registers so that normal coordinates are typed out instead of average coordinates.

When it is desired to type out data, the desired output is selected using the Teletype output mode switch on the Teletype. The point of interest in the model is then identified using the floating mark. If a multiple point average is desired, multiple readings are taken at this time. After averaging has been completed, the TYPE OUTPUT button is activated to cause the selected coordinates to be typed.

All average coordinate values are automatically cleared after each type-output operation in order to prepare for averaging at the next point. It is therefore impossible to type out more than one of the four combinations of information listed above for a given set of averages. It is possible, however to type out all information pertaining to a given set of averages by selecting the first combination.

4. Ground Scale Type-Out

The type-out of model coordinates and D_m will be in ground scale. Photo points will still be in photo scale. A ground scale multiplier will be entered through the viewer panel using Auxiliary Operations button number four. The multiplier is placed in the Type Output Routine for the Type-Out of model points and D_m .

5. Operation of Special AP-3 Programs

5.1 Digital Veltropolo Routine

The Digital Veltropolo Routine uses both the whole-number section and the DDA section to make its calculations. The

whole-number section is used to calculate the values of $\sin \gamma$ and $\cos \gamma$ once every 70 ms. It is also used to read the veltropolo rate switch and to enter the rate and calculated sines and cosines into the DDA.

The DDA multiplies the veltropolo rate with the calculated sines and cosines and produces X_m and Y_m inputs. Rates as high as 40 increments per iteration can be generated. Rates and angles are updated by the whole-number section once every 70 msec.

When the Digital Veltropolo Routine is entered, part of the DDA program is modified. This basically amounts to converting rate limits 3-2 and 3-3 into constant multipliers which are used for the sine and cosine multiplications and adding integrator 3-00 which is used for the veltropolo rate multiplication. If the computer is in the X-Z or Y-Z profile mode, rate limiter 1-6 is used instead of either 3-2 or 3-3.

6. Average and D_m Routine

The Average and D_m Routine is used to calculate multiple point averages of both model-point and photo-point coordinates and to calculate vector distances. The routine operates as originally specified except that the AVERAGE, D_m and CLEAR buttons must be activated in order to establish a reference point for measuring D_m . If an average has been taken, the average point is established as a reference; if no average has been taken, the average routine is passed through once before the reference is established. The latter case results in the setting up of the reference point at the current normal coordinates.

7. Change Profile Mode Routine

The Change Profile mode routine reads the profile mode switch and connects the coordinotograph axes to the appropriate LDA outputs. The coordinotograph is controlled by X_m and Y_m, X_m and E_m, or Y_m and E_m depending on the profile mode selected. The connections are changed by changing the AP program words for integrators 1-9 and 1-10 so that the appropriate coordinates are picked up.

8. Insertion of New Functions in W-N Routine

The AP-3 Computer has several routines which the AS-11A does not have. These routines are:

1. Change Profile Mode Routine
2. Type Output Routine
3. Average Routine
4. Veltropolo Routine $\frac{1}{2}^\circ$ Azimuth
5. Change Accuracy Routine

The following section describes the interconnection of these routines into the main whole-number program.

8.1 Change Profile Mode Routine

The Change Profile Mode routine is entered from the Master routine. The profile switch is tested for a change in each cycle of the master routine. If a change in the profile switch is detected, the Master routine exits to the Change Profile Mode routine.

8.2 Type Output Routine

The Type Output routine is entered from the Master routine if the TYPE OUTPUT button has been activated except as indicated in Section 8.3.

8.3 Average and D_m Routine

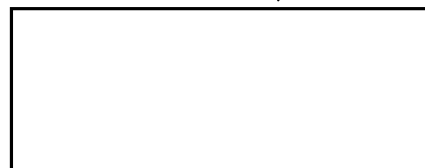
The Average and D_m routine is normally entered from the Status A and Status B routines. In the case that no averaging has been done, the Average and D_m routine is entered before the Type Output routine is entered.

8.4 Veltropolo Routine

The Veltropolo routine is entered from the select input routine if the veltropolo rate switch has been activated.

8.5 Change Accuracy Routine

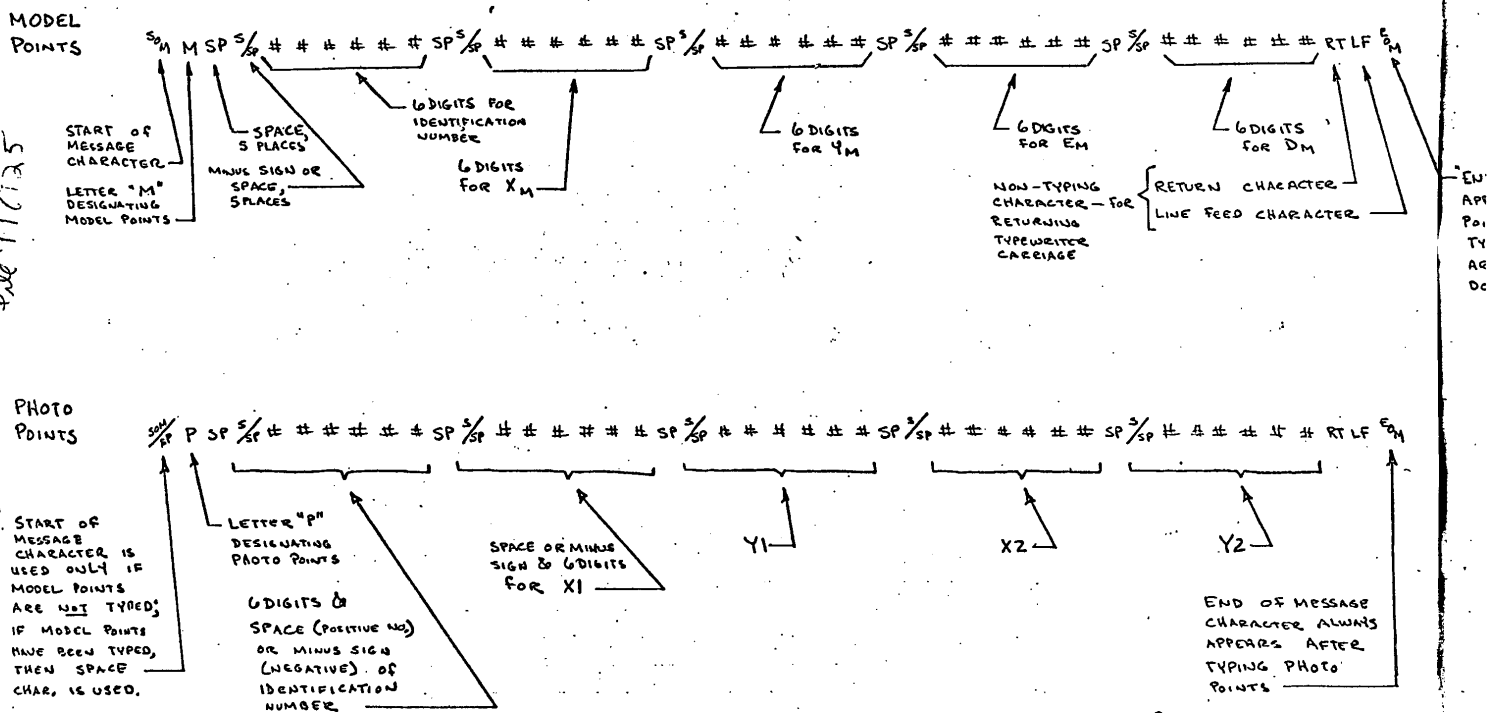
The Change Accuracy routine is entered by placing the Change Accuracy tape on the tape reader and activating the READ TAPE button. This cause the tape, which contains fixed data and part of the routine, to be read into the computer. When the tape has been completely read, the beginning of the Change Accuracy routine is automatically selected. After the routine completes making changes, it exits to the Master routine.



GAB/ss

AP-3 System

FORMAT FOR TYPE OUTPUT in Model 35 AW teletype



MODIFICATIONS FOR AP-3 STEREOPLOTTER

1. New Instructions:

Additional "Group N" instructions for AP-3 have been specified so as not conflict with the "Group N" instructions used in the AS11-A and AS11-B. These instructions and their functional operations are:

- A.) $N=10, 5^u$. This instruction resets flip-flop SA causing the computer to operate at an accuracy of 5 microns. Signal SA via a 15K resistor turns on the "5 micron accuracy" neon light on the viewer panel. The signal SA also qualifies certain and gates at the input of the servo logic so that the increment from the DDA to the servos is left-shifted twice before entering the proper shift register.
- B.) $N=11, 1\frac{1}{4}^u$. Essentially, this "Group N" instruction is the complement of $N=10$. It functions to set flip-flop SA thus telling the computer to perform its calculations at an accuracy of $1\frac{1}{4}$ microns. Via a 15K resistor the signal SA turns on the $1\frac{1}{4}$ micron accuracy neon light on the viewer panel. It also qualifies certain and gates to allow the DDA increment to go directly into the proper servo logic shift register.
- C.) $N=12$, read teletype mode. This "Group N" instruction reads the switches on the teletype panel:
 - 1. Teletype operating mode
 - a. Type input -- set OA27
 - b. Type and punch -- set OA26
 - c. Off line and computer run -- no connection to accumulator
 - 2. Output Data
 - a. Photo points -- no connection to accumulator
 - b. Model points and D_M -- set OA2
 - c. All -- set OA1
- D.) $N=13$, read digital veltropolo rate. This instruction in conjunction with read interrupt, $N=5$, reads the daven switch which determines the rate of motion in the direction selected by the veltropolo.
- E.) $N=14$, test profile switch. The three positions of profile switch, XZ, YZ, and XY and sampled by this instruction.
- F.) $N=16$, page A of memory. An or gate with $N=16$ and clear logic as inputs, drive the set side of flip-flop MP2, in order that memory lines MDO - to - dZ4, F1 and accumulator may be normally addressed.

G.) N=17, page B of memory. This instruction resets flip-flop MP2 and allows the second page of the memory to be addressed. At this time only one line, (MDO-B), is on the second page. However, anticipating automation of the AP-3, demands such built in flexibility.

2. Viewer Panel Interrupt Codes - (new):

In addition to the present AS11-A interrupt signals, additional codes have been added to the AP-3. The Status and Quantity codes for these functions are:

SWITCH GROUP		STATUS CODE					QUANTITY CODE							OTHER SWITCH GROUPS ACTIVATED
Operation	Switch	21	20	19	18	17	7	6	5	4	3	2	1	
AVERAGE	X		1			1								INITIATE
	Y		1			1					1			
	X _M		1	1	1	1								
	Y _M		1	1	1	1						1		
	E _M		1	1	1	1					1			
	D _M		1	1	1	1					1	1		
VELTROPOLO ANGLE AND PLOTING TABLE	✓									1				
	X scale								1					
	Y scale								1	1				

3. Digital Veltropolo

3.1 Veltropolo Angle Control

Both the direction and the speed of the veltropolo on the AP-3 are digitally controlled. The veltropolo angle is controlled by a dial located at the center of the viewer panel. The dial is connected to a 100 cycle/rev. quantizer (200 pulses/rev.) through gears with a 1=3.6 ratio. This gives 720 pulses per rotation of the veltropolo dial or resolution of one-half degree.

3.2 Veltropolo Speed Control

The speed of the veltropolo is controlled by a 12 position dāven switch. Its operation is similar to that of the rate input switch. The position of the veltropolo speed control is sampled by the read veltropolo rate instruction (N=13). This instructor activates OA

signals which set various flip-flops in the accumulator depending on the position of the switch. The following table indicates the OA signals which are activated for different switch position.

Switch Position	OA Signals														
	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13
1	1														
2	1														
3															1
4														1	1
5													1	1	1
6												1	1	1	1
7											1	1	1	1	1
8										1	1	1	1	1	1
9									1	1	1	1	1	1	1
10								1	1	1	1	1	1	1	1
11							1	1	1	1	1	1	1	1	1
12						1	1	1	1	1	1	1	1	1	1

4. Profile Switch

The profile switch is used to select one of three plotting modes: XY, YZ, or XZ. The XY mode is the contour mode in which the left handwheel controls X and the right handwheel controls Y. The YZ and XZ modes are the profile modes in which one of the handwheels controls Z instead of X or Y. In addition to switching the operation of the handwheels, the profile switch also switches the coordinatograph axes to correspond to the handwheel inputs. These changes are made by subroutines which change program words in the DDA program.

The profile switch is sampled by the Test Profile Switch instruction (N=14). This instruction causes accumulator bits to be set as follows depending on the position of the switch.

~~(1) XY - No connector.~~

- (1) XY - No connection to accumulator
- (2) YZ - OA1
- (3) XZ - OA2

5. Teletype Operation

The teletype machine associated with the AP-3 will have three operating modes: 1) Type Input, 2) Type and Punch and 3) Off Line and Computer Punch. These modes are selectable by a switch on the teletype console.

1. Type Input

This mode allows the operator to enter information into the computer via the teletype keyboard. Turning the selector switch to this mode of operator causes the computer to go into a routine in which it makes itself available to accept data from the teletype. When this mode is selected, the BUSY light on the viewer panel is lit. This tells the operator that the data may not be entered into the computer other than through the teletype keyboard.

2. The Type and Punch and Off Line and Computer Punch

The Type and Punch and Off Line and Computer Punch modes are functions which can be classified as Computer Run modes. When they are set, they do not disrupt the normal operation of computer, i.e., when they are selected, the computer ignores them until the operator pushes the punch button on the viewer panel. Since these modes are concerned with getting data out of the computer, their operation is further qualified by a second switch on the teletype console. This second switch selects the coordinates to be read out, namely:

- (1) Photo Points
- (2) Model Points and D_M
- (3) All (this includes both (1) and (2))

The operator then pushes the punch button on the viewer panel.

If the operator has selected the Type and Punch mode, the coordinates (he has selected on the second switch) are typed out on the teletype and punched out on paper tape. (In this mode, the coordinates are punched out by the tape punch in the teletype console).

Selecting the Off Line and Computer Punch mode, allow the operator to:

- a. Utilize the teletype in any auxiliary function not concerned with the operation of the computer.
- b. Punch out the coordinates chosen by second selector switch.

This punching mode utilizes the computer's punch which is located on the computer panel.

- c. Operate the viewer panel and computer in its normal calculating mode. (This function can also be performed when the Teletype Operating Mode is Type and Punch).

6. Average Function

The average function allows up to five readings of a point to be averaged. When the AVERAGE pushbutton is activated, average values may be calculated for x_1 , y_1 , x_2 , y_2 , X_M , Y_M , E_M , and D_M . All quantities are averaged simultaneously regardless of which quantity is selected by the switches. The quantity D_M is the vector distance between the previous model point coordinates punched or typed out (normal or average) and the current model point coordinates (normal or average). Up to five readings at a point may be averaged by moving off the point and back to get additional readings. Each reading is recorded by pressing the INITIATE pushbutton. If averaging is not done, the normal values will be displayed instead of average values. If it is desired to repeat the average operation without punching or typing out the calculated values, the normal coordinates may be restored to the average registers by pressing the CLEAR button. The calculated average values will be typed and/or punched out if the punch coordinates button is pressed. If no averages were calculated, the normal coordinates will be punched out instead.

The REPLACE or ADD pushbuttons, the incremental input, or the hand-wheels will not alter the average values displayed.

7. Coordinatograph Operation

The AP-3 Coordinatograph will be servo driven by circuitry identical to that used in the AS-11B automated computer. The servo motors will be driven by servo circuitry located in the correlator cabinet (to be used for future automation). The plotting scale of the coordinatograph is controlled by the X-scale and Y-scale pushbuttons. The desired plotting scale is entered by placing it in the data switches and pressing REPLACE. This causes the scale factor to be stored in the appropriate integrator.

8. Specific Correlator Functions and Contents of Cables.

The correlator cabinet will contain a transformer assembly and a servo amplifier assembly both capable of driving two servos in the X axis and one in the Y axis. This cabinet will also have a circuit breaker panel containing fuses for the servo power and auxiliary outlets. There will be a servo power switch in the front panel. The cables consist of one cable from the computer to the correlator and one cable from the coordinatograph to the correlator. There will also be a power cable which plugs into the wall.

9. Additional Memory Operation

The AP-3 control computer will require 10 additional 80-word lines that are not in the AS11-A. Nine of these ten lines can be added to an AS11-A within the present addressing structure (im 20 - to - im 29, included). In order to add the tenth long line, it is necessary to add a second page to the memory.

The operation of the two page memory is as follows:

1. Flip-flop MP2 which is set by N=16 or clear logic allows page A of the memory to be addressed. This includes all of the present AS11-A memory lines plus nine of the ten additional lines. With flip-flop MP2 set, all but the tenth additional line can be addressed in the same matter as is now done in the AS11-A.
2. Resetting flip-flop MP2 with N=17 allows page B of the memory to be addressed (only the tenth additional line). The address of this line is MDO-B.

10. Servo Logic Operation

The requirements of AP-3 for 5 micron and $1\frac{1}{4}$ micron accuracy, (switchable), presents two slightly different modes of operation in the servo logic. Basically the system uses two shift registers; one register is seven bits long and the other is three bits long. The operation of this system is:

1. 5 microns accuracy

The increment from the DDA comes out of the Z-lines at V3 and is immediately left-shifted 2 bits by flip-flops SL1 and SL2. The three least significant bits are then stripped out and added into the 3 flip-flop shift register through full adder SF13. The remaining 7 bits (including sign), of the increment are then shifted into the 7 bit shift register through a full adder associated with that particular axis; the sign is also extended to V4 · T3. Carries of weight 8 are also added during all SH1 times; this serves to cause the sign flip-flop (the seventh bit in the 7 bit register) to complement every 40 word times. This occurs by adding a total of 128 precarries of weight 8 to the 7 bit register full adder. Sampling the sign flip-flop (which will change every 40 word times if nothing is added from the DDA) provides a signal which generates a command carrier to the phase analogue portion of the servos. In generating the command carrier for 5 micron accuracy two strobe and delayed strobe (see timing chart). The normal strobe is used if the MSB in the 3 bit shift register is a one and the delayed strobe is used if it is a zero.

2. $1\frac{1}{4}$ micron accuracy

Since the accuracy of $1\frac{1}{4}$ microns is 4 times the accuracy of the 5 micron operation, the increment coming out of the DDA into the servos bypasses the left-shift flip-flops SL1 and SL2 and goes directly into the process described above. The generation of the command carrier at this accuracy, however, required that the sign flip-flop be sampled 4 times as often. Hence there are 8 strobe signals generated (see timing chart) --- the normal and delayed strobes plus 6 additional strobes. By decoding the contents of the 3 bit shift register, the correct strobe signal is selected. Once the proper strobe is selected, the operation of the remaining portion of the servo system is the same.

The operation of the coordinatograph will be the same as the above operation except that only one strobe will be used. That one strobe is the normal strobe.

Since only the normal strobe is used, the accuracy of the co-
tograph is only 40 microns. Its accuracy could easily be increased but to
do so would considerably reduce its slew speed.

The integrator allocations from which the different axes receive their increments from the ODA, the times at which they appear and the proper taps on the Z lines at which they are available at these times are contained in the following table.

AXIS	INTEGRATOR	TIME	ZF-LINE TAP
Y2	1-78	W04 • U2	ZD13
X2	1-66	W66 • U4	ZD11*
Y1	1-75	W79 • U2	ZD11*
X1	1-77	W80 • U3	ZD13
XT	1-10	W14 • U2	ZD11*
YT	Z-10	W16 • U1	ZD27

INSTALLATION ENGINEERING DATADate form completed 1 September 1966

(See Remarks at end of form)

Tentative ☐ Valid until _____Final data ☒

25X1

I. INSTRUMENT

A. Name of instrument: AP-3 Computer

B. Manufacturer: _____

C. Contract number: _____

D. Delivery date: Tentative: 30 September 1966 Final: _____

II. PHYSICAL FEATURES

A. Sub-assemblies:

1. Number of sub-assemblies: N/A
2. Largest sub-assembly: Weight _____ lbs; _____" H x _____" W x _____" D
3. Heaviest sub-assembly: Weight _____ lbs; _____" H x _____" W x _____" D

B. Assembled instrument:

1. Number of major components: Three: Computer, Servo Cabinet, Teletype.
2. Largest component: Weight 2,350 lbs; 6'9" H x 7'3" W x 2'3" D
3. Heaviest component: Weight Same lbs; _____" H x _____" W x _____" D
4. Total floor space required after assembly, including maintenance access space. 8 Ft. _____ In. High x 26 Ft. _____ In. Wide x 17 Ft. _____ In. Deep.
5. Total weight of assembled instrument: 2,900 lbs.

C. Type of base of mount: Flat ---; 3-point suspension ---; 4-point suspension YesD. Does the instrument have built-in mobility? Yes X No _____E. Is the instrument particularly sensitive to vibration? Yes _____ No X
Will the instrument generate vibration? Yes _____ No XF. Are any special or unusual tools or fixtures necessary or advisable for the installation of the maintenance of this instrument? Yes X No _____If "Yes," please describe: Model 445 Oscilloscope with delayed sweep (or equivalent). 25X1

III. UTILITIES

A. Electrical:

- | | | |
|--|---|---------------------|
| | AC | DC |
| 1. Voltage | <u>120</u> Volts / _____ Volts | _____ Volts / _____ |
| 2. Current | <u>30</u> Amps/phase | _____ Amps |
| 3. Frequency | <u>60</u> cps | |
| 4. Nr. of phases | <u>1</u> Ph | |
| 5. Nr. of wires | <u>3</u> | |
| 6. Power required | <u>3600</u> Watts | _____ Watts |
| 7. Power factor | <u>1</u> (Leading) (Lagging) | |
| 8. Type of outlet: | Two prong _____; three prong <u>X</u> ; Twist lock <u>X</u> ; Perm. _____ | |
| 9. Type of ground: | Building conduit <u>X</u> ; Direct earth ground _____ | |
| 10. Should the instrument be shielded, either from external electromagnetic signals or to prevent interference with other equipment? | Yes _____ No <u>X</u> | |
- If "Yes," to what extent? _____

Revised 1/66

B. Air conditioning:

- Desired environment: Room air temperature of 68 °F / 77 °F and relative humidity of 45 % / 60 %.
- Input Air: Is a direct connection necessary? Yes No X ;
Adviseable? Yes No X ; If "Yes," what is the connector type and size? Recommended input air temperature °F / °F.
Relative humidity % / %. If input air must be filtered, what is the maximum particle size in microns? What particle count? / cu. ft.
- Output Air: Is a direct connection to the return air duct necessary? Yes No X . Adviseable? Yes No . Connector type and size? . Output air temperature °F / °F. Relative humidity % / %. Output heat BTU/Hr. Flow of CFM. Is output air toxic? Yes No ; Noxious? Yes No .

C. Plumbing:

- Is water required? Yes No X ; Pressure PSIG, flow GPM.
- Type of water required:
Tap °F / °F Deionized °F / °F
Tempered °F / °F Filtered °F / °F
If filtered, give maximum permissible particle size in microns and the maximum permissible count. microns particles/cu. ft.
- Pipe required:
Galvanized Copper Size
Stainless Steel Plastic Type of connector
- Floor drain:
Diameter of drain Galvanized drain?
Plastic drain? Glass drain?
- Are any chemical solutions used in the device? Yes No . If "Yes," state the nature of the solution(s), permissible temperature range, flow rate in appropriate units and the filtration necessary for each solution .
- Size of pipes and connectors .

D. Compressed air:

Is compressed air required? Yes No X . Water free? Oil Free?
Type and size of connector? . Pressure PSIG. Flow in CFM
Maximum , minimum , average .

E. Vacuum:

Is vacuum required? Yes No X . Pressure PSIA or (inches of water) (millimeters of mercury). Displacement in CFM, maximum , minimum , average . Type and Size of connectors .

F. Peripheral Devices:

Will the instrument be connected to any peripheral devices such as a computer or data input or data output device? Yes X No . If "Yes," give, in detail, the nature of the connection to the peripheral device such as coaxial cable, multiple wire connector, etc. Computer is connected to Viewer and Coordinatograph with multiwire cables.

IV. REMARKS

- Use additional sheets if more space is required for environmental conditions or utilities not mentioned above.
- Submit three typed copies of the completed form to the Technical Representative.

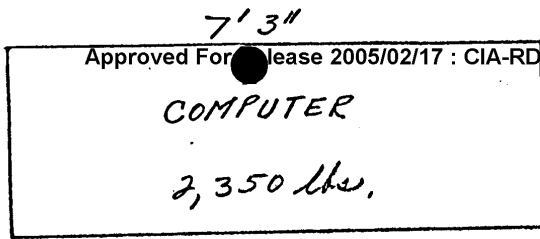
- C. Attach three copies of a dimensioned outline drawing of each major component and of the completed assembly. Include the estimated weight of each major component and of the completed assembly. Indicate, on the outline drawing of the completed assembly, the space required for access to the instrument for maintenance.
- D. If a question does not apply to the instrument, insert "N/A" (Not Applicable) in the appropriate blank space.

Information provided by:

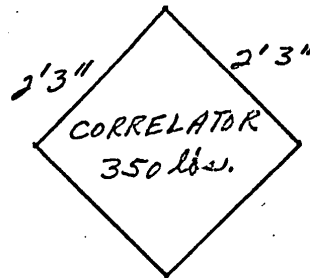


25X1

Project Supervisor
(Position or job title)

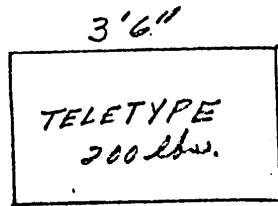


2'3"



SCALE 1/2" = 1 FT.

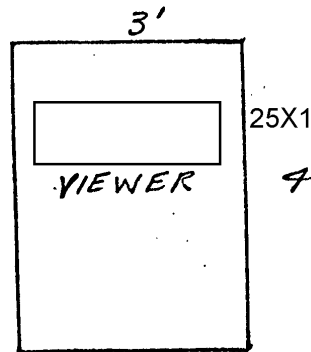
1. EQUIPMENT SHOULD BE LOCATED AT LEAST 3 FT. FROM WALL AND SPACED AS SHOWN.



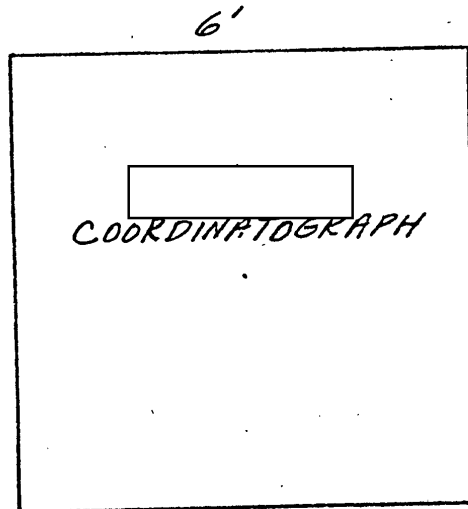
2'

2. POWER:
- A. TWIST LOCK 120V/AC
60 CYCLE - 1 EACH
1. COMPUTER - 30 AMPS
 2. CORRELATOR - 30 AMPS
 3. VIEWER - 8.5 AMPS

- B. THREE PRONG 120V/AC
60 CYCLE
1. TELETYPE - 10 AMPS



AP-3 LAYOUT



25X1

6'

INSTALLATION ENGINEERING

I. INSTRUMENT

A. Name AP/3

B. Manufacturer _____

C. Contract Number _____

II. PHYSICAL FEATURES

A. Number of Component Parts two (viewer and drawing table with Coordina-B. Dimensions of the Largest Component Part: viewer basement tographLength 3 Ft. 3 1/2 In. Height 3 Ft. 1 1/2 In.Width 3 Ft. 9 In.C. Weight of Largest Component Part 375 kg (viewer)D. Total Weight of Instrument 650 kg

E. Overall Dimensions Assembled:

Length _____ Ft. _____ In. Height _____ Ft. _____ In.

Width _____ Ft. _____ In.

F. Type of Base of Mount:

Flat // Three Point Suspension // Four Point Suspension yesG. Does Instrument have built-in mobility? yesH. Is the instrument particularly sensitive to vibration? yesI. Are any special or unusual tools or fixtures necessary or advisable for the installation or maintenance of this equipment? yes

III. UTILITIES

A. Electrical:

AC

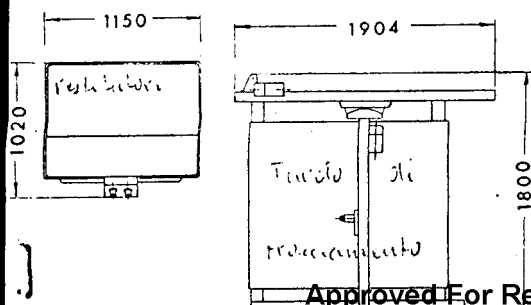
DC

Voltage 120 Volts + 5% VoltsCurrent 8.5 AmpsFrequency 60 cpsNr. of phases single phaseNr. of wires 3Power required by equipment 1000 Watts

Watts

Type of outlet required: Two Prong //, Three Prong //Twist Lock yes, Permanent Installation //

Should the equipment be shielded, either from external electromagnetic signals, or to prevent interference with other equipment?

no

B. Air Conditioning:

Room temperature 21° C Humidity 55%Output of Instrument BTU/Hr.If air must be filtered, what is maximum permissible particle size
in microns? // What particle count? //
particles per cubic foot.Direct connection to instrument? Yes // No noIf yes to above, what is the desired air temperature to instrument?
//Should discharged air be ducted separately? noIs discharged air noxious? no toxic? noConnector size to instrument //

C. Plumbing:

Is water required for the instrument? Yes // No noWater pressure // Flow in GPM //

Type of water desired:

Tap <u>//</u>	OF	+	<u>//</u>	OF
Tempered <u>//</u>	OF	+	<u>//</u>	OF
Deionized <u>//</u>	OF	+	<u>//</u>	OF
Filtered <u>//</u>	OF	+	<u>//</u>	OF

Particle size and count per
unit volume.

Type of pipe required:

Galvanized // Copper //Stainless Steel // Plastic //Is floor drain required? Yes // No //Diameter of drain // Galvanized drain //Plastic drain // Glass drain //

D. Compressed Air:

Diameter of connectors // Type of connectors //PSI // Water free? //CFM // Oil free? //

E. Vacuum:

Is vacuum required? Yes // No //Vacuum required // PSIA or // (inches) (milli-
meters) of HgDisplacement // CFM //

IV. REMARKS

In the event additional space is required for environmental conditions
or utilities not mentioned above, use the reverse side of this form.

INSTALLATION ENGINEERING DATADate form completed 1 September 1966

(See Remarks at end of form)

Tentative ☐ Valid until _____Final data ☒

I. INSTRUMENT

- A. Name of instrument: AP-3 Computer
- B. Manufacturer: 25X1
- C. Contract number: _____
- D. Delivery date: Tentative: 30 September 1966 Final: _____

II. PHYSICAL FEATURES

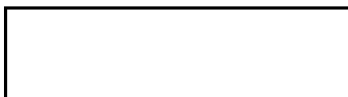
- A. Sub-assemblies:
- Number of sub-assemblies: N/A
 - Largest sub-assembly: Weight _____ lbs; _____" H x _____" W x _____" D
 - Heaviest sub-assembly: Weight _____ lbs; _____" H x _____" W x _____" D
- B. Assembled instrument:
- Number of major components: Three: Computer, Servo Cabinet, Teletype.
 - Largest component: Weight 2,350 lbs; 6'9" H x 7'3" W x 2'3" D
 - Heaviest component: Weight Same lbs; _____" H x _____" W x _____" D
 - Total floor space required after assembly, including maintenance access space. 8 Ft. _____ In. High x 26 Ft. _____ In. Wide x 17 Ft. _____ In. Deep.
 - Total weight of assembled instrument: 2,900 lbs.
- C. Type of base of mount: Flat ---; 3-point suspension ---; 4-point suspension Yes
- D. Does the instrument have built-in mobility? Yes X No _____
- E. Is the instrument particularly sensitive to vibration? Yes _____ No X
Will the instrument generate vibration? Yes _____ No X
- F. Are any special or unusual tools or fixtures necessary or advisable for the installation of the maintenance of this instrument? Yes X No _____
If "Yes," please describe: Tektronix Model 445 Oscilloscope with delayed sweep (or equivalent).

III. UTILITIES

- A. Electrical:
- | | | |
|--|---|------------------------------------|
| 1. Voltage | <u>120</u> Volts <u>AC</u> _____ Volts | <u>_____</u> Volts <u>DC</u> _____ |
| 2. Current | <u>30</u> Amps/phase | <u>_____</u> Amps |
| 3. Frequency | <u>60</u> cps | |
| 4. Nr. of phases | <u>1</u> Ph | |
| 5. Nr. of wires | <u>3</u> | |
| 6. Power required | <u>3600</u> Watts | <u>_____</u> Watts |
| 7. Power factor | <u>1</u> (Leading) (Lagging) | |
| 8. Type of outlet: | Two prong _____; three prong <u>X</u> ; Twist lock <u>X</u> ; Perm. _____ | |
| 9. Type of ground: | Building conduit <u>X</u> ; Direct earth ground _____ | |
| 10. Should the instrument be shielded, either from external electromagnetic signals or to prevent interference with other equipment? | Yes _____ No <u>X</u> | |
- If "Yes," to what extent? _____

Revised 1/66

Copy to



on 9-9-66

25X1

B. Air conditioning:

- Desired environment: Room air temperature of 68 °F / 77 °F and relative humidity of 45 % / 60 %.
- Input Air: Is a direct connection necessary? Yes ☐ No ☒ ; Adviseable? Yes ☐ No ☒ ; If "Yes," what is the connector type and size? _____ Recommended input air temperature ☐ °F / ☐ °F. Relative humidity ☐ % / ☐ %. If input air must be filtered, what is the maximum particle size in microns? _____ What particle count? _____ / cu. ft.
- Output Air: Is a direct connection to the return air duct necessary? Yes ☐ No ☒ . Adviseable? Yes ☐ No ☐ . Connector type and size? _____ . Output air temperature ☐ °F / ☐ °F. Relative humidity ☐ % / ☐ %. Output heat ☐ BTU/Hr. Flow of ☐ CFM. Is output air toxic? Yes ☐ No ☐ ; Noxious? Yes ☐ No ☐ .

C. Plumbing:

- Is water required? Yes ☐ No ☒ ; Pressure ☐ PSIG, flow ☐ GPM.
- Type of water required:
 Tap ☐ °F / ☐ °F Deionized ☐ °F / ☐ °F
 Tempered ☐ °F / ☐ °F Filtered ☐ °F / ☐ °F
 If filtered, give maximum permissible particle size in microns and the maximum permissible count. _____ microns _____ particles/cu. ft.
- Pipe required:
 Galvanized _____ Copper _____ Size _____
 Stainless Steel _____ Plastic _____ Type of connector _____
- Floor drain:
 Diameter of drain _____ Galvanized drain? _____
 Plastic drain? _____ Glass drain? _____
- Are any chemical solutions used in the device? Yes ☐ No ☐ . If "Yes," state the nature of the solution(s), permissible temperature range, flow rate in appropriate units and the filtration necessary for each solution _____.
- Size of pipes and connectors _____.

D. Compressed air:

Is compressed air required? Yes ☐ No ☒ . Water free? ☐ Oil Free? ☐
 Type and size of connector? _____ . Pressure ☐ PSIG. Flow in CFM _____
 Maximum _____, minimum _____, average _____.

E. Vacuum:

Is vacuum required? Yes ☐ No ☒ . Pressure ☐ PSIA or (inches of water) (millimeters of mercury). Displacement in CFM, maximum _____, minimum _____, average _____ . Type and Size of connectors _____.

F. Peripheral Devices:

Will the instrument be connected to any peripheral devices such as a computer or data input or data output device? Yes ☒ No ☐ . If "Yes," give, in detail, the nature of the connection to the peripheral device such as coaxial cable, multiple wire connector, etc. Computer is connected to ☐ Viewer and Coordinatograph with multiwire cables.

IV. REMARKS

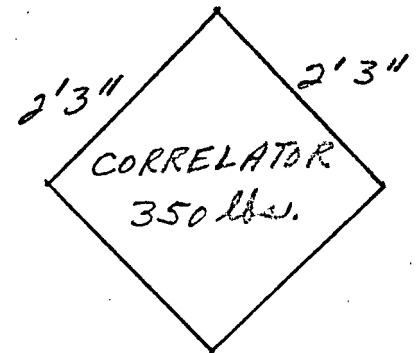
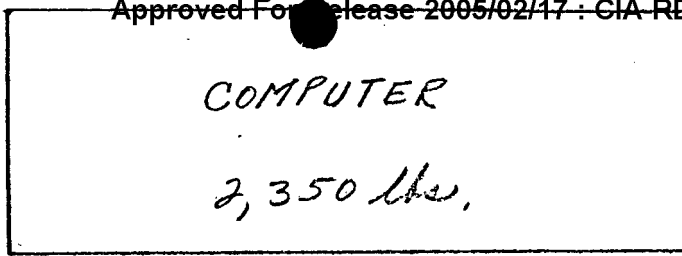
- Use additional sheets if more space is required for environmental conditions or utilities not mentioned above.
- Submit three typed copies of the completed form to the Technical Representative.

- C. Attach three copies of a dimensioned outline drawing of each major component and of the completed assembly. Include the estimated weight of each major component and of the completed assembly. Indicate, on the outline drawing of the completed assembly, the space required for access to the instrument for maintenance.
- D. If a question does not apply to the instrument, insert "N/A" (Not Applicable) in the appropriate blank space.

Information provided by:

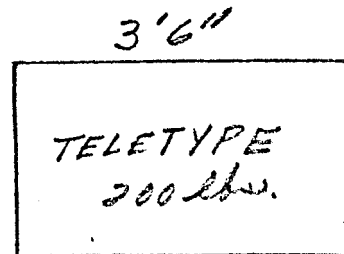
25X1

Project Supervisor
(Position or job title)



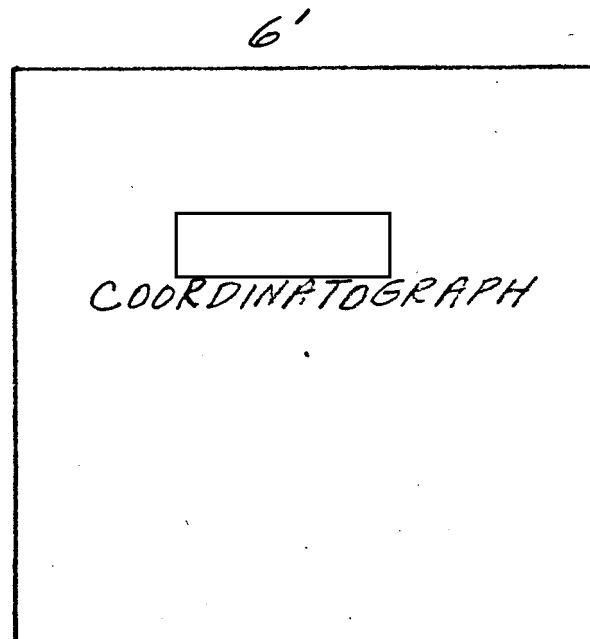
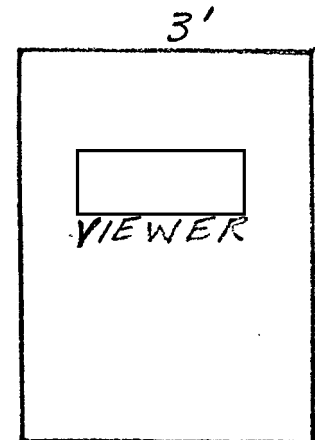
SCALE 1/2" = 1 FT.

1. EQUIPMENT SHOULD BE
LOCATED AT LEAST 3 FT.
FROM WALL AND SPACED
AS SHOWN.



2. POWER:
- A. TWIST LOCK 120V/AC
60 CYCLE - 1 EACH
 - 1. COMPUTER - 30 AMPS
 - 2. CORRELATOR - 30 AMPS
 - 3. VIEWER - 8.5 AMPS

- B. THREE PRONG 120V/AC
60 CYCLE
 - 1. TELETYPE - 10 AMPS



AP-3 LAYOUT

25X1

Approved For Release 2005/02/17 : CIA-RDP78B04770A000100110064-0

Approved For Release 2005/02/17 : CIA-RDP78B04770A000100110064-0

John - According to [redacted] at
a meeting last week - they have no
programming requirements from TID
for the following equipment:

- ① Point Transfer Device (no stores programs of any kind)
- Comparator [redacted] (Two years away - no problem)

AP-3

Rectifier (2 years away)

Time Reader (1 year away)

Film Reader - Mod 2 (1 1/2 - 2 yrs away)

Should we get into this??

5X1

AP2-

AF 30

AMS 11

Computer I/O capability - ^{tech referring to high speed paper} ~~tape~~
 Increased Resolution of digitizers - 1M - 2M pulse ^{see note below}
 Programs available \leftrightarrow Machinery
 Resolving power & Mag - 100 lines per mm ~~mapping~~
 • Anamorphic eyepieces
 Eyepiece zoom range - 1 to 5 Delivery Time (6-9 months)

AP.2 versus C - sensor used instead of synchro on platter
 Distance button - to give vector distance - rectified
 3 dimensional distance between 2 points

• roll film capability

Image correlation correlation
 Profile capability in image correlation
 Ortho photo scope to be installed after image correlation

Modifications by

25

local area increased measurement capability

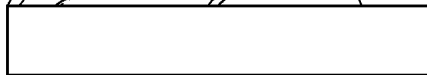
Output - paper tape, typewriter, video, plotter

Can name computer code -

Interchangeable field lenses for high
 scale differences

X1

1 Programming assistance from contractor



2 Programs from ACIC

3 Training operators

4 Maintenance

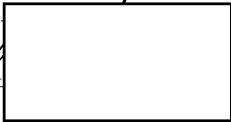
~~RIC/1 magnification~~

18550

6400

12150

X1

Call  to get price on
order.

1. What else is it capable of doing besides maps
 - A Measurements (Stereo)
 - B profiles & contours
 - C ground photography
 - D large scale installation ^{engineering} layouts

• Modifications

1. Servos instead of synchros
2. Distance readout buttons
3. 24 pulses with 1/4 slow mode
4. Magnification increase
5. Increase resolution
6. (Hard copy
7. Teletype hard copy printer
8. I/O investigation - Map type, high speed paper
9. Image correlation device
10. Amorphous expense adaptability